

This listing of claims will replace all prior versions,
and listings, of claims in the application:

1 Claim 1 (currently amended): For use with a node, a method
2 comprising:

- 3 a) accepting status information from at least two
- 4 different protocols;
- 5 b) composing a message including the status
- 6 information; and
- 7 c) sending the message towards a neighbor node.

1 Claim 2 (original): The method of claim 1 further
2 comprising:

- 3 d) maintaining a first timer for tracking a send time
- 4 interval, wherein the acts of composing a message and
- 5 sending the message are performed after expiration of
- 6 the first timer; and
- 7 e) restarting the first timer after the message is
- 8 sent.

1 Claim 3 (original): The method of claim 2 wherein the
2 message further includes a dead time interval, and wherein
3 the send time interval is less than the dead time interval.

1 Claim 4 (original): The method of claim 2 wherein the
2 message further includes a dead time interval, and wherein
3 the send time interval is no more than one third of the
4 dead time interval.

1 Claim 5 (original): The method of claim 2 wherein the send
2 time interval is less than one second.

1 Claim 6 (original): The method of claim 2 wherein the send
2 time interval is less than 100 msec.

1 Claim 7 (original): The method of claim 1 wherein the
2 message further includes a dead time interval.

1 Claim 8 (original): The method of claim 1 wherein the act
2 of sending the message includes providing the message in an
3 Internet protocol packet.

1 Claim 9 (original): The method of claim 8 wherein the act
2 of sending the message towards the neighbor node includes
3 setting a destination address in the Internet protocol
4 packet to a multicast address associated with routers that
5 support aggregated protocol liveness.

1 Claim 10 (original): The method of claim 1 wherein the
2 neighbor node has at least one protocol peering with at
3 least one of the at least two protocols.

1 Claim 11 (original): The method of claim 1 wherein the
2 status information includes a protocol state selected from
3 a group of protocols states consisting of (A) protocol up,
4 (B) protocol down, (C) protocol not reporting, and (D)
5 protocol restarting.

1 Claim 12 (currently amended): For use with a node, a
2 method comprising:

3 a) receiving a message including

4 i) for a first set of at least two different
5 protocols of a neighbor node, status information
6 for each of the protocols of the first set, and
7 ii) a time interval; and
8 b) updating neighbor node protocol status information
9 using the message.

1 Claim 13 (original): The method of claim 12 wherein the
2 act of updating neighbor node protocol status information
3 includes

4 i) setting a first timer to the time interval
5 and starting the first timer,
6 ii) if the first timer expires, setting the
7 status of each of the protocols of the neighbor
8 node to down, and
9 iii) if a further message, sourced from the
10 neighbor node, and including
11 A) for a second set of at least two
12 protocols, status information for each of
13 the protocols of the second set, and
14 B) a new time interval,
15 is received then, resetting the first timer to
16 the new time interval and restarting the first
17 timer.

1 Claim 14 (original): The method of claim 13 wherein each
2 of the time interval and the new time interval is less than
3 one second.

1 Claim 15 (original): The method of claim 12 wherein the
2 status information includes a protocol state selected from
3 a group of protocols states consisting of (A) protocol up,

4 (B) protocol down, (C) protocol not reporting, and (D)
5 protocol restarting.

1 Claim 16 (original): The method of claim 13 wherein the
2 act of updating neighbor node protocol status information
3 further includes

4 iv) if the further message is received then, in
5 addition to resetting the first timer to the new
6 time interval and restarting the first timer,
7 further

8 A) determining whether the first set of at
9 least two protocols is the same as the
10 second set of at least two protocols,
11 B) if the first set of at least two
12 protocols is determined to be the same as
13 the second set of at least two protocols,
14 then for each of the at least two protocols
15 of both the first and second sets having a
16 changed status, informing a locally running
17 instance of the protocol of the changed
18 status of its peer protocol of the neighbor
19 node, and
20 C) if the first set of at least two
21 protocols is determined to be different from
22 the second set of at least two protocols,
23 then

24 1) for any protocol in the second set
25 but not in the first set, informing a
26 locally running instance of the
27 protocol of the status indicated in the
28 further message of its peer protocol of
29 the neighbor node, and

30 2) for any protocol in the first set
31 but not in the second set, informing a
32 locally running instance of the
33 protocol that the status of its peer
34 protocol of the neighbor node is down.

1 Claim 17 (original): The method of claim 16 wherein each
2 of the message and the further message include an
3 indication of a relative message age, and wherein the act
4 of updating neighbor node protocol status information
5 includes,
6 iv) if the further message is received then, in
7 addition to resetting the first timer to the new
8 time interval and restarting the first timer,
9 further
10 A) determining whether the further message
11 is younger than the message, and
12 B) if it is determined that the further
13 message is not younger than the message,
14 then discarding the further message.

1 Claim 18 (original): The method of claim 13 wherein each
2 of the message and the further message include an
3 indication of a relative message age, and wherein the act
4 of updating neighbor node protocol status information
5 includes,
6 iv) if the further message is received then, in
7 addition to resetting the first timer to the new
8 time interval and restarting the first timer,
9 further
10 A) determining whether the further message
11 is younger than the message, and

12 B) if it is determined that the further
13 message is not younger than the message,
14 then discarding the further message.

1 Claim 19 (currently amended): A method for monitoring
2 liveness of multiple protocols, the method comprising:
3 a) determining, at a first node, status information
4 for at least two different protocols;
5 b) sending, from the first node, a message including
6 the determined status information to a second node;
7 c) receiving, at the second node, the message; and
8 d) updating, by the second node, first node protocol
9 status information using the message.

1 Claim 20 (original): The method of claim 19 wherein the
2 message further includes a first time interval, and wherein
3 the act of updating neighbor node protocol status
4 information includes
5 i) setting a timer to the first time interval;
6 ii) starting the timer;
7 iii) determining whether or not a further
8 message including protocol status information is
9 received from the first node by the second node
10 before the expiration of the timer; and
11 iv) if it is determined that a further message
12 including protocol status information is not
13 received from the first node by the second node
14 before the expiration of the timer, then
15 informing peer protocols of the second node that
16 the at least two protocols of the first node are
17 down.

1 Claim 21 (original): The method of claim 19 wherein the
2 status information includes a protocol state selected from
3 a group of protocols states including at least (A) protocol
4 up, (B) protocol down, (C) protocol not reporting, and (D)
5 protocol restarting.

1 Claim 22 (currently amended): A machine-readable medium
2 having stored thereon a machine readable data structure
3 comprising:

- 4 a) an indication, for at least two different
5 protocols of a node, of a state of each of the at
6 least two protocols; and
- 7 b) a dead interval.

1 Claim 23 (original): The machine-readable medium of claim
2 22 wherein the indication indicates a protocol state
3 selected from a group of protocols states consisting of (A)
4 protocol up, (B) protocol down, (C) protocol not reporting,
5 and (D) protocol restarting.

1 Claim 24 (original): The machine-readable medium of claim
2 22 further comprising:
3 c) an identifier of the node.

1 Claim 25 (original): The machine-readable medium of claim
2 24 wherein the node is a router and wherein the identifier
3 is a router identifier.

1 Claim 26 (original): The machine-readable medium of claim
2 22 further comprising:
3 c) an interface index.

1 Claim 27 (currently amended): For use with a node,
2 elements comprising:
3 a) means for accepting status information from at
4 least two different protocols;
5 b) means for composing a message including the status
6 information; and
7 c) means for sending the message towards a neighbor
8 node.

1 Claim 28 (original): The elements of claim 27 further
2 comprising:
3 d) means for maintaining a first timer for tracking a
4 send time interval, wherein the means for composing a
5 message and sending the message compose and send the
6 message after expiration of the first timer; and
7 e) means for restarting the first timer after the
8 message is sent.

1 Claim 29 (original): The elements of claim 28 wherein the
2 message further includes a dead time interval, and wherein
3 the send time interval is less than the dead time interval.

1 Claim 30 (original): The elements of claim 28 wherein the
2 message further includes a dead time interval, and wherein
3 the send time interval is no more than one third of the
4 dead time interval.

1 Claim 31 (original): The elements of claim 28 wherein the
2 send time interval is less than one second.

1 Claim 32 (original): The elements of claim 28 wherein the
2 send time interval is less than 100 msec.

1 Claim 33 (original): The elements of claim 27 wherein the
2 message further includes a dead time interval.

1 Claim 34 (original): The elements of claim 27 wherein the
2 means for sending the message include means for providing
3 the message in an Internet protocol packet.

1 Claim 35 (original): The elements of claim 34 wherein the
2 means for sending the message towards the neighbor node
3 include means for setting a destination address in the
4 Internet protocol packet to a multicast address associated
5 with routers that support aggregated protocol liveness.

1 Claim 36 (original): The elements of claim 27 wherein the
2 neighbor node has at least one protocol peering with at
3 least one of the at least two protocols.

1 Claim 37 (original): The elements of claim 27 wherein the
2 status information includes a protocol state selected from
3 a group of protocols states consisting of (A) protocol up,
4 (B) protocol down, (C) protocol not reporting, and (D)
5 protocol restarting.

1 Claim 38 (currently amended): For use with a node,
2 elements comprising:

- 3 a) an input for receiving a message including
4 i) for a first set of at least two different
5 protocols of a neighbor node, status information
6 for each of the protocols of the first set, and
7 ii) a time interval; and

8 b) means for updating neighbor node protocol status
9 information using the message.

1 Claim 39 (original): The elements of claim 38 wherein the
2 means for updating neighbor node protocol status
3 information include

4 i) means for setting a first timer to the time
5 interval and starting the first timer,
6 ii) means for setting the status of each of the
7 protocols of the neighbor node to down if the
8 first timer expires, and
9 iii) means, if a further message, sourced from
10 the neighbor node, and including
11 A) for a second set of at least two
12 protocols, status information for each of
13 the protocols of the second set, and
14 B) a new time interval,
15 is received, for resetting the first timer to the
16 new time interval and restarting the first timer.

1 Claim 40 (original): The elements of claim 39 wherein each
2 of the time interval and the new time interval is less than
3 one second.

1 Claim 41 (original): The elements of claim 38 wherein the
2 status information includes a protocol state selected from
3 a group of protocols states consisting of (A) protocol up,
4 (B) protocol down, (C) protocol not reporting, and (D)
5 protocol restarting.

1 Claim 42 (original): The elements of claim 39 wherein the
2 means for updating neighbor node protocol status
3 information further include
4 iv) means for
5 A) determining whether the first set of at
6 least two protocols is the same as the
7 second set of at least two protocols,
8 B) if the first set of at least two
9 protocols is determined to be the same as
10 the second set of at least two protocols,
11 then for each of the at least two protocols
12 of both the first and second sets having a
13 changed status, informing a locally running
14 instance of the protocol of the changed
15 status of its peer protocol of the neighbor
16 node, and
17 C) if the first set of at least two
18 protocols is determined to be different from
19 the second set of at least two protocols,
20 1) for any protocol in the second set
21 but not in the first set, informing a
22 locally running instance of the
23 protocol of the status indicated in the
24 further message of its peer protocol of
25 the neighbor node, and
26 2) for any protocol in the first set
27 but not in the second set, informing a
28 locally running instance of the
29 protocol that the status of its peer
30 protocol of the neighbor node is down.
31 if the further message is received.

1 Claim 43 (original): The elements of claim 42 wherein each
2 of the message and the further message include an
3 indication of a relative message age, and wherein the means
4 for updating neighbor node protocol status information
5 include,

6 iv) means for

7 A) determining whether the further message
8 is younger than the message, and

9 B) if it is determined that the further
10 message is not younger than the message,
11 then discarding the further message.

12 if the further message is received.

1 Claim 44 (original): The elements of claim 39 wherein each
2 of the message and the further message include an
3 indication of a relative message age, and wherein the means
4 for updating neighbor node protocol status information
5 include,

6 iv) means for

7 A) determining whether the further message
8 is younger than the message, and

9 B) if it is determined that the further
10 message is not younger than the message,
11 then discarding the further message.

1 Claim 45 (currently amended): A system comprising:

2 a) a first node adapted to

3 i) determine status information for at least two
4 different protocols, and

5 ii) send a message including the determined
6 status information to a second node; and

7 b) the second node adapted to

8 i) receive the message; and
9 ii) update first node protocol status
10 information using the message.

1 Claim 46 (original): The system of claim 45 wherein the
2 message further includes a first time interval, and wherein
3 the act of updating the first node protocol status
4 information includes

5 A) setting a timer to the first time
6 interval;
7 B) starting the timer;
8 C) determining whether or not a further
9 message including protocol status
10 information is received from the first node
11 by the second node before the expiration of
12 the timer; and
13 D) if it is determined that a further
14 message including protocol status
15 information is not received from the first
16 node by the second node before the
17 expiration of the timer, then informing peer
18 protocols of the second node that the at
19 least two protocols of the first node are
20 down.

1 Claim 47 (original): The system of claim 46 wherein the
2 status information includes a protocol state selected from
3 a group of protocols states including at least (A) protocol
4 up, (B) protocol down, (C) protocol not reporting, and (D)
5 protocol restarting.

1 Claim 48 (new): The method of claim 1 wherein the status
2 information is local protocol status information.

1 Claim 49 (new): The method of claim 1 wherein the status
2 information is local status information and wherein each of
3 the at least two different protocols is bring run locally
4 on the node.